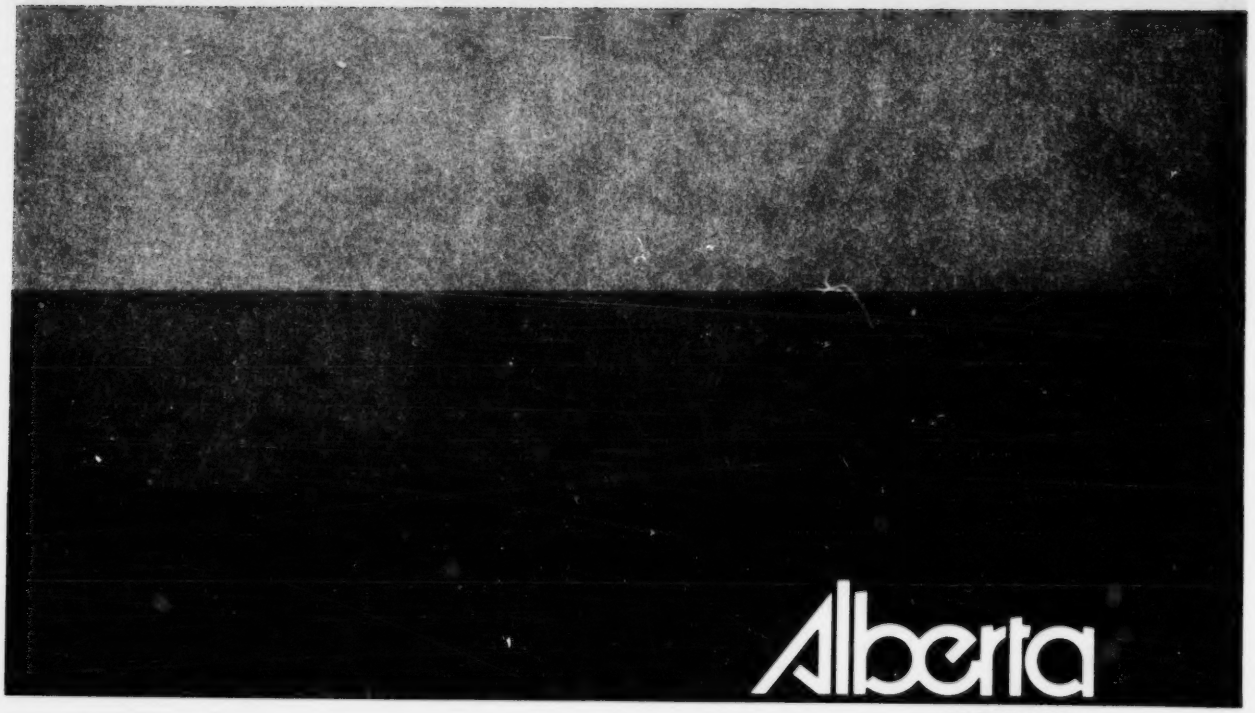

TREASURY
Bureau of Statistics

ECONOMIC MULTIPLIERS FOR ALBERTA INDUSTRIES AND COMMODITIES

(Based on 1979 Input-Output Tables)

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NOTE TO READERS

This report presents the most current economic multipliers for the Alberta economy. The multipliers have been derived from the 1979 provincial input-output tables, which are produced quinquennially by the Alberta Bureau of Statistics based on information acquired from Statistics Canada.

The level of detail presented is, hopefully, sufficient to meet most needs; however, alternate aggregations of industries and commodities can be produced from the input-output tables. The Bureau will accept special requests for copies of the input-output tables or other industry/commodity aggregations, subject to resource constraints associated with ongoing work plans and commitments. For such special requests or assistance in using these multipliers readers should contact the Head, Economic and Demographic Models at the Bureau. For more general information or additional copies of this report please contact:

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ECONOMIC MULTIPLIERS FOR

ALBERTA INDUSTRIES AND COMMODITIES

(Based on 1979 Input-Output Tables)

INTRODUCTION

This report presents economic multipliers for the Alberta economy. The multipliers are 1979-based and produced from the most recent, 1979, provincial input-output tables. The data update the previous 1974-based multipliers published by the Alberta Bureau of Statistics in 1984. Multipliers are provided for up to 38 types of industries and 73 commodities, the same level of detail as the 1974 multipliers.

The report is divided into five parts. Following the Introduction is "What are Multipliers?", which gives a description of the various types of economic multipliers and their uses. The third section, "Using Multipliers", works through examples of using multipliers to measure the economic impact of a newly established manufacturing plant and a case of increasing exports. Also presented in this section are cautionary notes on using and interpreting multipliers. Twelve tables with the multipliers follow as the next section. A final section, the appendix, details data sources and the methodology used in deriving the multipliers and gives a comparison of the 1979 and 1974 multipliers.

The narrative of this report has been reduced compared to the explanations and examples provided in the previous publication released in 1984. Readers requiring further assistance in applying the data presented are encouraged to consult the 1984 publication, if they have it, or should not hesitate to contact the Bureau as outlined in the "Note to Readers" on page i.

WHAT ARE MULTIPLIERS?

Economic multipliers provide a means to quantitatively measure and assess the impact of changes in an economy. These changes could occur, for example, because of the establishment (or

closing) of a business, such as a manufacturing plant; an increase in the demand for a natural resource, like coal; a switch in consumer demand arising from new technologies; or a decrease in imports due to a change in import duties. Multipliers can measure these changes in terms of the impact in employment, household income and the economy in general via the increase or decrease in provincial gross domestic product. These uses are further explained in the next section.

Multipliers are derived from input-output (I-O) tables which detail the interindustry relationships of production activities describing how much output each industry bought from and sold to other industries in the economy. Given the vast amount of detail required to compile I-O tables, it is a very time intense process. As such, provincial I-O tables are produced only every five years, the most recent being 1979.[1]

Multipliers are calculated using two basic I-O models, open and closed. Multipliers calculated from the closed model generally are called "total multipliers" while those from the open model are termed "simple multipliers". When there is a change in the economy the resulting impacts can be thought of as emanating out in two ways--a direct and indirect industry effect and an induced income effect. Total multipliers capture both industry effects and income effects, whereas simple multipliers measure only the industry effect. The multipliers provided in the

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[1] Although these multipliers are based on the 1979 input-ouput tables, and reflect the economic structure of that reference year, studies have shown that these multipliers are reasonably stable over time. Appendix III provides a 1979 and 1974 comparison.

publication are total multipliers. Although simple multipliers have only limited use and are not provided in this publication, they are available upon special request. More details about the open and closed models are presented in Appendix II.

USING MULTIPLIERS

Four types of multipliers for measuring the impact of economic change are presented in this publication. Namely, multipliers for household income, gross domestic product (GDP) at factor cost, employment and gross output are presented in each table. These multipliers are presented in two forms, absolute multipliers and ratio multipliers. When used to determine the impact of a given change these multipliers are applied to an economy assumed to have leakages or no leakages. Thus, in order to use the appropriate multiplier users have to ascertain whether to use an absolute form multiplier, either with or without leakages, or a ratio form multiplier, with or without leakages.

Absolute vs. Ratio Multipliers

Absolute multipliers, for a given change, provide a measure in terms of all four types of multipliers: household income, GDP at factor cost, employment and gross output. For ratio multipliers, however, the given change and the type of multiplier applied can only be in the same terms. That is, for ratio multipliers, if the initial given change is in terms of employment, then only the employment multiplier can be used (a ratio of employment to employment) to measure the impact on employment in the economy. The following example will illustrate and further explain these differences.

Example of a case to establish a new plant.

Suppose a chemical plant--costing $100 million to construct and with a planned annual production (output) of $20 million which will employ 952 people during construction and have a permanent work force of 100--is to be built in Alberta. Both the construction impact and the longer run plant production should be considered. For this situation, absolute rather than ratio multipliers would be used. Absolute multipliers will provide the total impact in terms of all four types of multipliers--household income, GDP at factor cost, employment and gross output. In this case, ratio multipliers could only be used to calculate a partial impact as related to employment or output, since the initial data only includes information on these two multiplier types.

For this example, the industry multipliers would be used rather than the commodity multipliers since the given data is in general industry terms, i.e. a chemical plant rather than for a specific commodity, such as paint products. (If more detail was given, then generally the multipliers with the greater degree of disaggregation would be used.)

Finally, for this example, the with leakages multipliers are appropriate (with or without leakages is further explained later in this section).

The multiplier calculations would use Table 6 for both the construction and the production impacts. Although the construction industry is also presented in Table 2, as pointed out in the "Cautionary Notes" when the same industry appears in both the major and detailed tables, the multipliers from the latter should be used.

From Table 6, line 29, the economic impact (combined direct, indirect and induced) of the $100 million (m) construction phase would be an increase of:

- household income	0.636 x $100m = $ 63.6m
- GDP at factor cost	0.911 x $100m = $ 91.1m
- gross output	2.680 x $100m = $268.0m
- employment (is based on per $10,000 and is expressed in 1979 dollars)	0.325 x 7,000* = 2,275 person years employment

*The deflated $1979 value of $100m is $70m thus the employment factor is $\frac{\$\ 70,000,000}{\$10,000} = 7,000$.

The above figures provide the temporary impact on the economy during the construction phase. A similar set of calculations using Table 6, line 27 for the chemical industries would be required to determine the impact of the plant's longer run, ongoing annual production operations. The total impact would be the combined construction and ongoing operation of the proposed plant.

Ratio multipliers could have been used in this case but only for the employment impact. For example, using Table 8, line 29, construction employment would have generated a total of 952 x 2.390 = 2,275 person years of employment (which corresponds to the figure generated above).

Example of a case of export promotion.

Suppose expanded marketing efforts result in an increase of $100 million of coal exports from Alberta. The impact of

an increase in the demand for a commodity should normally be measured by commodity multipliers. When looking specifically at the impacts resulting from changes in the level of exports, the assumption is made that all goods exported have been produced in Alberta. In other words, any goods imported into Alberta are consumed in the province and thus cannot be part of any exports. In multiplier analysis, this means there can be no leakages at the final demand stage (although leakages at the intermediate demand level are appropriate).

The with commodity leakages multipliers in this publication have been derived to include leakages at the final demand stage (as well as at the intermediate demand level). This makes them unsuitable for measuring the impact of changes in the export levels of commodities. However, it should be noted that suitable commodity multipliers (that do not allow final demand leakages) can be derived and are available from the Alberta Bureau of Statistics on request.

The industry multipliers in this publication are derived on the basis of intermediate demand leakages only. Thus, in the case where the commodity in question is produced only by one industry, the industry multipliers can be used since they are identical to the commodity multipliers derived.

Since coal comes from one industry (coal mines), the impact of the $100 million increase in exports can be determined from Table 6, line 4, assuming some leakages at the intermediate level. For example, in this case, household income will increase by $47.7 million.

Leakages vs. Without Leakages

As indicated, in addition to choosing one of the two forms of

multipliers, one second consideration before using multipliers, is to determine whether a with or without leakages model is more applicable.

When there is an increase in demand (increased production would increase the demand for inputs) this can be met by goods produced in Alberta or by goods imported[2] into the province from elsewhere in Canada or internationally. Increased demand met by other than Alberta produced goods represents leakages. Benefits associated with the leakages are reflected beyond Alberta. The extent of these leakages supplanting domestic production in the supply of a commodity, will reduce the benefits of an increase in final demand.

Multipliers are derived with leakages (i.e., reflecting the actual situation) and without leakages (i.e., under the assumption that all demand is met by domestic production). Comparing a multiplier derived with and without leakages indicates the impact of the leakages on the economy for that particular industry or commodity. If an industry or commodity has a much higher multiplier without leakages than it does with leakages, then any increase in final demand will be met largely through imports rather than domestic production.

Cautionary Notes:

Before using the multipliers presented in this publication, readers should review the following cautionary notes.

1. The multiplier values are derived from a simple static input-output model, which assumes capacity exists to meet

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[2] In addition to imports, part of the increased demand could be met by inventory withdrawal or government produced goods.

an increase in demand. For a situation where an increase in demand can only be met by increasing capacity through an investment in new plant and equipment, the actual impact on the economy would be higher than that indicated by the multipliers in this publication.

2. The multipliers have not been adjusted for price changes since 1979. For ratio multipliers this does not create a problem since the method of deriving them results in their not being influenced significantly by price changes. The absolute multipliers for household income, G.D.P. and gross output also are not significantly affected, assuming that price changes for these factors parallel those for commodities and industry output. This is not an unreasonable assumption in most cases. It is the absolute employment multipliers where the effect of price changes is significant. Adjustments for price changes have to be made before employing these multipliers (as illustrated in the examples presented in the Using Multipliers section).

3. For an industry (e.g., petroleum and coal products) which is highly vertically integrated and uses arbitrary valuation methods in transferring product from one level of the industry to another (e.g., crude petroleum transferred to refineries), the ratio multipliers for income, employment and G.D.P. can be distorted and should be used with caution. If the value attached to the product being transferred from one level to another in the integrated industry is arbitrarily high, the resulting ratio multipliers (because of the way these multipliers are calculated) overstate the impact.

4. Multipliers can be derived with or without leakages. For the former, the leakages may be at the intermediate demand

stage or at both the intermediate and final demand stages.[3] When using multipliers with leakages, one must always be aware of what leakages have been included so as not to misuse the multipliers. With a view to making them applicable to as many different situations as possible, the industry with leakage multipliers in this publication have been derived to include intermediate demand leakages only while the commodity with leakage multipliers include both intermediate and final demand leakages. As pointed out in the Using the Multipliers Section, one area where such commodity multipliers are not appropriate is when considering the impact of increased exports.

5. Some industries (e.g. agriculture, forestry, communications) are common to both the major industry and detailed industry multiplier tables. Similarly, some commodities (e.g., live animals, forestry products, beverages) are found in both the major and detailed commodity multiplier tables. In such cases, the multiplier values are somewhat different between the two levels of aggregation. Where this occurs, the multipliers for the more detailed level should be used. Multipliers based on a larger, more detailed input-output table are considered to be more accurate because the larger the table the easier it is to take into account the interdependencies among industries.

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[3] To produce goods and services, industries require input goods and services. For example, the agriculture industry uses gasoline, fertilizers, machinery, etc. to produce grain, live animals and other agricultural products. When the goods and services are being demanded for the production process (e.g., gasoline, fertilizers, etc. in the above example), this is known as intermediate demand. When goods and services are being demanded by final consumers (including government) for ultimate consumption (and not as part of the production process) this is final demand.

6. When comparing differences between multipliers with and without leakages, although either absolute or ratio multipliers can be used (depending on how the information is specified), the calculated differences are not necessarily directly comparable between the two forms of multipliers. As indicated in point 5 above, leakages are different between industry and commodity multipliers. The former have been derived to include only leakages at the intermediate demand stage while commodity multipliers include leakages at both the intermediate and final demand stages.

TABLES

TOTAL MULTIPLIERS BY INDUSTRY

TABLE 1. TOTAL MULTIPLIERS (ABSOLUTE FORM, WITHOUT LEAKAGES)
BY MAJOR INDUSTRY, 1979

	INDUSTRY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1	AGRICULTURE	.959	1.651	.637	4.129
2	FORESTRY	1.353	1.883	.788	5.491
3	FISHING, HUNTING AND TRAPPING	.719	1.466	.263	3.135
4	MINES, QUARRIES AND OIL WELLS	.474	1.258	.216	2.831
5	MANUFACTURING	.878	1.560	.484	4.560
6	CONSTRUCTION	.993	1.615	.524	4.603
7	TRADE	1.148	1.756	.782	4.354
8	TRANSPORTATION AND STORAGE	.940	1.594	.507	4.164
9	COMMUNICATIONS	.929	1.661	.491	3.562
10	UTILITIES	.839	1.784	.334	3.372
11	FINANCE, INSURANCE AND REAL ESTATE	.562	1.284	.227	2.674
12	COMM., BUS. AND PERSONAL SERVICES	1.089	1.721	.759	4.316
13	DUMMY INDUSTRY I (1)	.867	1.463	.520	5.025
14	DUMMY INDUSTRY II (2)	.869	1.468	.524	4.813
15	TRANSPORTATION MARGINS (3)	.940	1.594	.507	5.163
16	HOUSEHOLDS (4)	.668	1.173	.385	3.923

SEE FOOTNOTE(S) AT END OF TOTAL MULTIPLIERS TABLES

TABLE 2. TOTAL MULTIPLIERS (ABSOLUTE FORM, WITH LEAKAGES)
BY MAJOR INDUSTRY, 1979

	INDUSTRY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1	AGRICULTURE	.644	1.090	.461	2.567
2	FORESTRY	.894	1.073	.533	3.265
3	FISHING, HUNTING AND TRAPPING	.488	1.057	.135	1.992
4	MINES, QUARRIES AND OIL WELLS	.313	.959	.129	2.044
5	MANUFACTURING	.492	.873	.268	2.656
6	CONSTRUCTION	.594	.906	.301	2.625
7	TRADE	.851	1.228	.617	2.909
8	TRANSPORTATION AND STORAGE	.617	1.024	.327	2.603
9	COMMUNICATIONS	.695	1.247	.360	2.431
10	UTILITIES	.642	1.433	.224	2.410
11	FINANCE, INSURANCE AND REAL ESTATE	.419	1.029	.148	1.979
12	COMM., BUS. AND PERSONAL SERVICES	.784	1.178	.587	2.819
13	DUMMY INDUSTRY I (1)	.316	.483	.214	2.250
14	DUMMY INDUSTRY II (2)	.429	.702	.273	2.714
15	TRANSPORTATION MARGINS (3)	.383	.636	.203	2.616
16	HOUSEHOLDS (4)	.344	.599	.205	2.343

SEE FOOTNOTE(S) AT END OF TOTAL MULTIPLIERS TABLES

TABLE 3. TOTAL MULTIPLIERS (RATIO FORM, WITHOUT LEAKAGES)
BY MAJOR INDUSTRY, 1979

	INDUSTRY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1	AGRICULTURE	2.601	2.762	2.125	4.129
2	FORESTRY	2.637	4.436	2.541	5.491
3	FISHING, HUNTING AND TRAPPING	2.213	1.905	6.581	3.135
4	MINES, QUARRIES AND OIL WELLS	4.152	2.337	6.126	2.831
5	MANUFACTURING	4.870	5.658	5.891	4.560
6	CONSTRUCTION	3.198	4.408	3.847	4.603
7	TRADE	2.172	2.719	1.814	4.354
8	TRANSPORTATION AND STORAGE	2.893	3.127	3.188	4.164
9	COMMUNICATIONS	2.055	1.999	2.286	3.562
10	UTILITIES	2.002	1.768	3.371	3.372
11	FINANCE, INSURANCE AND REAL ESTATE	2.265	1.766	4.347	2.674
12	COMM., BUS. AND PERSONAL SERVICES	2.283	2.691	1.867	4.316

TABLE 4. TOTAL MULTIPLIERS (RATIO FORM, WITH LEAKAGES)
BY MAJOR INDUSTRY, 1979

	INDUSTRY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1	AGRICULTURE	1.746	1.822	1.538	2.567
2	FORESTRY	1.742	2.529	1.721	3.265
3	FISHING, HUNTING AND TRAPPING	1.504	1.374	3.371	1.992
4	MINES, QUARRIES AND OIL WELLS	2.737	1.780	3.670	2.044
5	MANUFACTURING	2.729	3.167	3.258	2.656
6	CONSTRUCTION	1.913	2.472	2.214	2.625
7	TRADE	1.610	1.901	1.429	2.909
8	TRANSPORTATION AND STORAGE	1.898	2.009	2.058	2.603
9	COMMUNICATIONS	1.536	1.501	1.674	2.431
10	UTILITIES	1.530	1.419	2.263	2.410
11	FINANCE, INSURANCE AND REAL ESTATE	1.689	1.415	2.828	1.979
12	COMM., BUS. AND PERSONAL SERVICES	1.642	1.842	1.446	2.819

TABLE 5. TOTAL MULTIPLIERS (ABSOLUTE FORM, WITHOUT LEAKAGES)
BY DETAILED INDUSTRY, 1979

	INDUSTRY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1	AGRICULTURE	.972	1.661	.650	4.141
2	FORESTRY	1.403	1.917	.823	5.556
3	FISHING, HUNTING AND TRAPPING	.753	1.492	.289	3.170
4	COAL MINES	.751	1.476	.378	3.512
5	PETROLEUM AND GAS WELLS	.443	1.233	.200	2.700
6	OTHER MINES AND QUARRIES	.702	1.453	.406	3.371
7	SERVICES INCIDENTAL TO MINING	.988	1.644	.508	4.287
8	MEAT AND POULTRY PRODUCTS INDUSTRY	1.045	1.704	.660	5.361
9	DAIRY FACTORIES	1.117	1.798	.666	5.231
10	MISC. FOOD INDUSTRIES	1.004	1.677	.608	5.009
11	BEVERAGE INDUSTRIES	.899	1.581	.483	4.239
12	RUBBER INDUSTRIES	1.092	1.693	.577	4.708
13	LEATHER INDUSTRIES	1.092	1.728	.677	5.618
14	TEXTILE INDUSTRIES	.919	1.603	.536	4.544
15	CLOTHING INDUSTRIES	.961	1.655	.616	4.119
16	WOOD INDUSTRIES	1.141	1.763	.651	4.946
17	FURNITURE AND FIXTURES INDUSTRIES	.938	1.621	.556	4.181
18	PAPER AND ALLIED INDUSTRIES	.941	1.618	.505	4.527
19	PRINTING AND PUBLISHING	1.279	1.869	.713	5.149
20	PRIMARY METAL INDUSTRIES	.721	1.311	.369	3.652
21	METAL FABRICATING INDUSTRIES	1.047	1.666	.551	4.556
22	MACHINERY INDUSTRIES	1.045	1.673	.549	4.553
23	TRANSPORTATION EQUIPMENT INDUSTRIES	1.206	1.785	.672	5.210
24	ELECTRICAL PRODUCTS INDUSTRIES	1.251	1.818	.677	5.257
25	NON-METALLIC MINERAL PRODUCTS INDUSTRIES	.887	1.569	.463	4.221
26	PETROLEUM AND COAL PRODUCTS INDUSTRIES	.550	1.288	.253	3.874
27	CHEMICAL AND CHEMICAL PRODUCTS INDUSTRIES	.678	1.425	.342	3.767
28	MISC. MANUFACTURING INDUSTRIES	1.041	1.689	.613	4.702
29	CONSTRUCTION INDUSTRY	1.118	1.702	.595	4.805
30	WHOLESALE AND RETAIL TRADE INDUSTRY	1.189	1.786	.814	4.421
31	TRANSPORTATION AND STORAGE INDUSTRY	.961	1.606	.523	4.205
32	COMMUNICATIONS INDUSTRY	.965	1.688	.519	3.622
33	UTILITIES	.881	1.815	.364	3.451
34	FINANCE, INSURANCE AND REAL ESTATE	.587	1.302	.246	2.716
35	HEALTH AND HOSPITAL INDUSTRY	1.202	1.821	.548	4.257
36	BUSINESS SERVICES INDUSTRY	1.500	2.037	.957	4.800
37	ACCOMMODATION AND FOOD SERVICES INDUSTRY	1.130	1.749	.916	4.657
38	OTHER PERSONAL AND MISC. SERVICES INDUSTRY	.947	1.612	.700	4.046
39	DUMMY INDUSTRY I (1)	.973	1.539	.579	5.100
40	DUMMY INDUSTRY II (2)	.993	1.560	.621	5.048
41	TRANSPORTATION MARGINS (3)	.961	1.606	.523	5.203
42	HOUSEHOLDS (4)	.716	1.210	.428	4.015

SEE FOOTNOTE(S) AT END OF TOTAL MULTIPLIERS TABLES

TABLE 6. TOTAL MULTIPLIERS (ABSOLUTE FORM, WITH LEAKAGES) BY DETAILED INDUSTRY, 1979

INDUSTRY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1 AGRICULTURE	.648	1.107	.468	2.656
2 FORESTRY	.890	1.070	.536	3.284
3 FISHING, HUNTING AND TRAPPING	.487	1.051	.137	1.983
4 COAL MINES	.477	1.018	.225	2.290
5 PETROLEUM AND GAS WELLS	.278	.948	.111	1.978
6 OTHER MINES AND QUARRIES	.454	1.037	.268	2.264
7 SERVICES INCIDENTAL TO MINING	.618	1.028	.301	2.639
8 MEAT AND POULTRY PRODUCTS INDUSTRY	.617	.980	.408	3.424
9 DAIRY FACTORIES	.601	.927	.358	2.923
10 MISC. FOOD INDUSTRIES	.504	.834	.312	2.734
11 BEVERAGE INDUSTRIES	.480	.884	.247	2.345
12 RUBBER INDUSTRIES	.610	.846	.308	2.417
13 LEATHER INDUSTRIES	.606	.916	.390	3.348
14 TEXTILE INDUSTRIES	.371	.648	.223	1.918
15 CLOTHING INDUSTRIES	.522	.910	.359	2.077
16 WOOD INDUSTRIES	.613	.918	.351	2.636
17 FURNITURE AND FIXTURES INDUSTRIES	.491	.881	.305	2.160
18 PAPER AND ALLIED INDUSTRIES	.474	.837	.245	2.405
19 PRINTING AND PUBLISHING	.733	.964	.408	2.680
20 PRIMARY METAL INDUSTRIES	.361	.685	.176	1.952
21 METAL FABRICATING INDUSTRIES	.553	.835	.284	2.289
22 MACHINERY INDUSTRIES	.540	.831	.275	2.268
23 TRANSPORTATION EQUIPMENT INDUSTRIES	.548	.717	.304	2.304
24 ELECTRICAL PRODUCTS INDUSTRIES	.589	.724	.316	2.322
25 NON-METALLIC MINERAL PRODUCTS INDUSTRIES	.523	.939	.263	2.554
26 PETROLEUM AND COAL PRODUCTS INDUSTRIES	.330	.905	.133	2.890
27 CHEMICAL AND CHEMICAL PRODUCTS INDUSTRIES	.352	.829	.166	2.220
28 MISC. MANUFACTURING INDUSTRIES	.527	.794	.324	2.274
29 CONSTRUCTION INDUSTRY	.636	.911	.325	2.680
30 WHOLESALE AND RETAIL TRADE INDUSTRY	.851	1.228	.622	2.930
31 TRANSPORTATION AND STORAGE INDUSTRY	.608	1.023	.325	2.645
32 COMMUNICATIONS INDUSTRY	.693	1.244	.364	2.437
33 UTILITIES	.650	1.433	.233	2.430
34 FINANCE, INSURANCE AND REAL ESTATE	.421	1.027	.152	1.985
35 HEALTH AND HOSPITAL INDUSTRY	.876	1.284	.360	2.817
36 BUSINESS SERVICES INDUSTRY	1.132	1.432	.745	3.181
37 ACCOMMODATION AND FOOD SERVICES INDUSTRY	.741	1.101	.690	2.888
38 OTHER PERSONAL AND MISC. SERVICES INDUSTRY	.630	1.090	.520	2.654
39 DUMMY INDUSTRY I (1)	.324	.481	.221	2.229
40 DUMMY INDUSTRY II (2)	.442	.686	.307	2.735
41 TRANSPORTATION MARGINS (3)	.377	.636	.202	2.642
42 HOUSEHOLDS (4)	.345	.597	.215	2.364

SEE FOOTNOTE(S) AT END OF TOTAL MULTIPLIERS TABLES

TABLE 7. TOTAL MULTIPLIERS (RATIO FORM, WITHOUT LEAKAGES)
BY DETAILED INDUSTRY, 1979

INDUSTRY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1 AGRICULTURE	2.636	2.778	2.167	4.141
2 FORESTRY	2.734	4.517	2.654	5.556
3 FISHING, HUNTING AND TRAPPING	2.319	1.938	7.228	3.170
4 COAL MINES	2.851	2.319	3.783	3.512
5 PETROLEUM AND GAS WELLS	5.539	2.312	9.987	2.700
6 OTHER MINES AND QUARRIES	3.068	2.322	2.854	3.371
7 SERVICES INCIDENTAL TO MINING	2.804	2.923	3.629	4.287
8 MEAT AND POULTRY PRODUCTS INDUSTRY	12.485	20.685	19.374	5.361
9 DAIRY FACTORIES	5.470	7.115	7.403	5.231
10 MISC. FOOD INDUSTRIES	6.815	7.385	8.318	5.009
11 BEVERAGE INDUSTRIES	3.630	3.259	4.617	4.239
12 RUBBER INDUSTRIES	2.873	3.911	3.394	4.708
13 LEATHER INDUSTRIES	6.704	8.370	7.035	5.618
14 TEXTILE INDUSTRIES	4.372	4.320	4.327	4.544
15 CLOTHING INDUSTRIES	2.778	2.724	2.460	4.119
16 WOOD INDUSTRIES	3.947	4.246	4.208	4.946
17 FURNITURE AND FIXTURES INDUSTRIES	3.288	3.030	3.110	4.181
18 PAPER AND ALLIED INDUSTRIES	4.539	4.163	5.637	4.527
19 PRINTING AND PUBLISHING	2.864	3.899	3.040	5.149
20 PRIMARY METAL INDUSTRIES	3.731	3.340	4.913	3.652
21 METAL FABRICATING INDUSTRIES	3.144	3.633	3.629	4.556
22 MACHINERY INDUSTRIES	3.207	3.506	3.784	4.553
23 TRANSPORTATION EQUIPMENT INDUSTRIES	3.811	5.394	4.154	5.210
24 ELECTRICAL PRODUCTS INDUSTRIES	3.410	5.311	3.692	5.257
25 NON-METALLIC MINERAL PRODUCTS INDUSTRIES	3.472	3.426	4.193	4.221
26 PETROLEUM AND COAL PRODUCTS INDUSTRIES	11.531	24.723	24.659	3.874
27 CHEMICAL AND CHEMICAL PRODUCTS INDUSTRIES	4.636	3.535	6.423	3.767
28 MISC. MANUFACTURING INDUSTRIES	3.317	4.009	3.151	4.702
29 CONSTRUCTION INDUSTRY	3.600	4.644	4.367	4.805
30 WHOLESALE AND RETAIL TRADE INDUSTRY	2.248	2.765	1.887	4.421
31 TRANSPORTATION AND STORAGE INDUSTRY	2.957	3.150	3.289	4.205
32 COMMUNICATIONS INDUSTRY	2.134	2.031	2.414	3.622
33 UTILITIES	2.100	1.799	3.675	3.451
34 FINANCE, INSURANCE AND REAL ESTATE	2.366	1.792	4.699	2.716
35 HEALTH AND HOSPITAL INDUSTRY	2.067	2.368	3.043	4.257
36 BUSINESS SERVICES INDUSTRY	1.893	2.399	1.794	4.800
37 ACCOMMODATION AND FOOD SERVICES INDUSTRY	2.705	3.218	1.869	4.657
38 OTHER PERSONAL AND MISC. SERVICES INDUSTRY	2.728	2.744	2.012	4.046

TABLE 8. TOTAL MULTIPLIERS (RATIO FORM, WITH LEAKAGES)
BY DETAILED INDUSTRY, 1979

	INDUSTRY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1	AGRICULTURE	1.759	1.851	1.559	2.656
2	FORESTRY	1.735	2.520	1.730	3.284
3	FISHING, HUNTING AND TRAPPING	1.499	1.366	3.423	1.983
4	COAL MINES	1.809	1.599	2.252	2.290
5	PETROLEUM AND GAS WELLS	3.484	1.777	5.531	1.978
6	OTHER MINES AND QUARRIES	1.985	1.657	1.884	2.264
7	SERVICES INCIDENTAL TO MINING	1.754	1.828	2.153	2.639
8	MEAT AND POULTRY PRODUCTS INDUSTRY	7.374	11.894	11.958	3.424
9	DAIRY FACTORIES	2.942	3.670	3.980	2.923
10	MISC. FOOD INDUSTRIES	3.421	3.674	4.263	2.734
11	BEVERAGE INDUSTRIES	1.941	1.823	2.361	2.345
12	RUBBER INDUSTRIES	1.605	1.955	1.812	2.417
13	LEATHER INDUSTRIES	3.722	4.437	4.053	3.348
14	TEXTILE INDUSTRIES	1.763	1.748	1.798	1.918
15	CLOTHING INDUSTRIES	1.508	1.498	1.436	2.077
16	WOOD INDUSTRIES	2.119	2.212	2.272	2.636
17	FURNITURE AND FIXTURES INDUSTRIES	1.720	1.647	1.705	2.160
18	PAPER AND ALLIED INDUSTRIES	2.285	2.154	2.731	2.405
19	PRINTING AND PUBLISHING	1.641	2.011	1.739	2.680
20	PRIMARY METAL INDUSTRIES	1.871	1.745	2.345	1.952
21	METAL FABRICATING INDUSTRIES	1.661	1.820	1.867	2.289
22	MACHINERY INDUSTRIES	1.658	1.781	1.893	2.268
23	TRANSPORTATION EQUIPMENT INDUSTRIES	1.732	2.166	1.879	2.304
24	ELECTRICAL PRODUCTS INDUSTRIES	1.605	2.116	1.726	2.322
25	NON-METALLIC MINERAL PRODUCTS INDUSTRIES	2.050	2.050	2.382	2.554
26	PETROLEUM AND COAL PRODUCTS INDUSTRIES	6.912	17.364	12.978	2.890
27	CHEMICAL AND CHEMICAL PRODUCTS INDUSTRIES	2.409	2.056	3.115	2.220
28	MISC. MANUFACTURING INDUSTRIES	1.678	1.883	1.667	2.274
29	CONSTRUCTION INDUSTRY	2.048	2.485	2.390	2.680
30	WHOLESALE AND RETAIL TRADE INDUSTRY	1.610	1.901	1.442	2.930
31	TRANSPORTATION AND STORAGE INDUSTRY	1.871	2.006	2.044	2.645
32	COMMUNICATIONS INDUSTRY	1.534	1.497	1.693	2.437
33	UTILITIES	1.550	1.420	2.352	2.430
34	FINANCE, INSURANCE AND REAL ESTATE	1.697	1.414	2.899	1.985
35	HEALTH AND HOSPITAL INDUSTRY	1.506	1.670	2.000	2.817
36	BUSINESS SERVICES INDUSTRY	1.428	1.687	1.396	3.181
37	ACCOMMODATION AND FOOD SERVICES INDUSTRY	1.773	2.026	1.407	2.888
38	OTHER PERSONAL AND MISC. SERVICES INDUSTRY	1.816	1.855	1.495	2.654

TABLES

TOTAL MULTIPLIERS BY COMMODITY

TABLE 9. TOTAL MULTIPLIERS (ABSOLUTE FORM, WITHOUT LEAKAGES)
BY MAJOR COMMODITY, 1979

COMMODITY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1 LIVE ANIMALS	.959	1.651	.637	4.129
2 GRAINS	.959	1.651	.637	4.129
3 OTHER AGRICULTURAL PRODUCTS	.958	1.650	.636	4.134
4 FISHING AND TRAPPING PRODUCTS	.719	1.466	.263	3.135
5 FORESTRY PRODUCTS	1.295	1.846	.755	5.338
6 MINERAL FUELS	.475	1.259	.216	2.833
7 NON-METALLIC MINERALS	.581	1.338	.289	3.264
8 PRODUCTS RELATING TO MINES	.474	1.259	.216	2.832
9 MEAT, FISH AND DAIRY PRODUCTS	.886	1.567	.494	4.545
10 FRUIT, VEG., FEED & MISC. FOOD PROD.	.882	1.563	.488	4.557
11 BEVERAGES	.878	1.560	.484	4.560
12 RUBBER, LEATHER, PLASTIC FAB. PROD.	.879	1.561	.486	4.558
13 TEXTILE PRODUCTS	.882	1.563	.489	4.556
14 KNITTED PRODUCTS AND CLOTHING	.881	1.562	.487	4.557
15 LUMBER, SAWMILL, OTHER WOOD PROD.	.881	1.562	.487	4.557
16 FURNITURE AND FIXTURES	.878	1.560	.484	4.559
17 PAPER AND PAPER PRODUCTS	.880	1.562	.486	4.558
18 PRINTING AND PUBLISHING	.878	1.560	.484	4.559
19 PRIMARY METAL PRODUCTS	.878	1.560	.484	4.559
20 METAL FABRICATING PRODUCTS	.879	1.561	.485	4.559
21 MACHINERY AND EQUIPMENT	.851	1.540	.468	4.417
22 AUTOS, TRUCKS, OTHER TRANS. EQUIP.	.892	1.568	.491	4.487
23 ELECTRICAL AND COMMUNICATIONS PROD.	.907	1.605	.498	4.186
24 NON-METALLIC MINERAL PRODUCTS	.878	1.560	.484	4.559
25 PETROLEUM AND COAL PRODUCTS	.745	1.461	.396	3.988
26 CHEMICALS AND CHEMICAL PRODUCTS	.879	1.561	.486	4.558
27 MISC. MANUFACTURED PRODUCTS	.892	1.570	.500	4.549
28 CONSTRUCTION	.993	1.615	.524	4.603
29 WHOLESALE AND RETAIL TRADE	1.137	1.749	.771	4.357
30 TRANSPORTATION AND STORAGE	.940	1.594	.507	4.163
31 COMMUNICATION SERVICES	.929	1.661	.491	3.562
32 OTHER UTILITIES	.841	1.778	.339	3.405
33 REAL ESTATE RENT	.575	1.294	.238	2.724
34 FINANCE, INSURANCE AND REAL ESTATE	.560	1.283	.228	2.681
35 BUSINESS, PERSONAL & OTHER MISC. SVCS	1.071	1.707	.736	4.268
36 DUMMY COMMODITY I (1)	.867	1.463	.520	5.025
37 DUMMY COMMODITY II (2)	.869	1.468	.524	4.813
38 TRANSPORTATION MARGINS (3)	.940	1.594	.507	5.163
39 HOUSEHOLD SERVICES (4)	.668	1.173	.385	3.923

SEE FOOTNOTE(S) AT END OF TOTAL MULTIPLIERS TABLES

TABLE 10. TOTAL MULTIPLIERS (ABSOLUTE FORM, WITH LEAKAGES)
BY MAJOR COMMODITY, 1979

	COMMODITY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1	LIVE ANIMALS	.569	.964	.408	2.270
2	GRAINS	.519	.878	.372	2.069
3	OTHER AGRICULTURAL PRODUCTS	.457	.774	.327	1.829
4	FISHING AND TRAPPING PRODUCTS	.076	.164	.021	.308
5	FORESTRY PRODUCTS	.596	.745	.357	2.230
6	MINERAL FUELS	.312	.955	.129	2.037
7	NON-METALLIC MINERALS	.071	.185	.033	.432
8	PRODUCTS RELATING TO MINES	.313	.959	.129	2.044
9	MEAT, FISH AND DAIRY PRODUCTS	.400	.704	.223	2.113
10	FRUIT, VEG., FEED & MISC. FOOD PROD.	.197	.349	.108	1.056
11	BEVERAGES	.260	.462	.142	1.406
12	RUBBER, LEATHER, PLASTIC FAB. PROD.	.087	.154	.048	.469
13	TEXTILE PRODUCTS	.034	.059	.018	.179
14	KNITTED PRODUCTS AND CLOTHING	.039	.068	.021	.207
15	LUMBER, SAWMILL, OTHER WOOD PROD.	.205	.363	.112	1.099
16	FURNITURE AND FIXTURES	.150	.266	.082	.809
17	PAPER AND PAPER PRODUCTS	.116	.206	.064	.624
18	PRINTING AND PUBLISHING	.234	.416	.128	1.265
19	PRIMARY METAL PRODUCTS	.103	.183	.056	.556
20	METAL FABRICATING PRODUCTS	.145	.256	.079	.778
21	MACHINERY AND EQUIPMENT	.059	.107	.032	.316
22	AUTOS, TRUCKS, OTHER TRANS. EQUIP.	.034	.059	.018	.174
23	ELECTRICAL AND COMMUNICATIONS PROD.	.035	.063	.019	.158
24	NON-METALLIC MINERAL PRODUCTS	.304	.540	.166	1.641
25	PETROLEUM AND COAL PRODUCTS	.408	.850	.209	2.311
26	CHEMICALS AND CHEMICAL PRODUCTS	.131	.232	.072	.705
27	MISC. MANUFACTURED PRODUCTS	.044	.077	.025	.231
28	CONSTRUCTION	.594	.906	.301	2.625
29	WHOLESALE AND RETAIL TRADE	.825	1.199	.595	2.856
30	TRANSPORTATION AND STORAGE	.383	.636	.203	1.616
31	COMMUNICATION SERVICES	.663	1.190	.343	2.320
32	OTHER UTILITIES	.516	1.145	.183	1.953
33	REAL ESTATE RENT	.410	.989	.150	1.922
34	FINANCE, INSURANCE AND REAL ESTATE	.351	.867	.125	1.672
35	BUSINESS, PERSONAL & OTHER MISC. SVCS	.642	.977	.473	2.328
36	DUMMY COMMODITY I (1)	.316	.483	.214	2.250
37	DUMMY COMMODITY II (2)	.429	.702	.273	2.714
38	TRANSPORTATION MARGINS (3)	.383	.636	.203	2.616
39	HOUSEHOLD SERVICES (4)	.344	.599	.205	2.343

SEE FOOTNOTE(S) AT END OF TOTAL MULTIPLIERS TABLES

TABLE 11. TOTAL MULTIPLIERS (ABSOLUTE FORM, WITHOUT LEAKAGES)
BY DETAILED COMMODITY, 1979

COMMODITY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1 LIVE ANIMALS	.972	1.661	.650	4.141
2 GRAINS	.972	1.661	.650	4.141
3 OTHER AGRICULTURAL PRODUCTS	.973	1.661	.650	4.150
4 FISHING AND TRAPPING PRODUCTS	.753	1.492	.289	3.170
5 FORESTRY PRODUCTS	1.359	1.892	.799	5.425
6 COAL	.751	1.476	.378	3.512
7 CRUDE MINERAL OILS	.443	1.233	.200	2.702
8 NATURAL GAS	.443	1.233	.200	2.701
9 NON-METALLIC MINERALS	.508	1.286	.248	2.889
10 SERVICES INCIDENTAL TO MINING	.984	1.641	.506	4.273
11 MEAT PRODUCTS	1.046	1.705	.664	5.299
12 DAIRY PRODUCTS	1.117	1.797	.666	5.229
13 FISH PRODUCTS	1.045	1.704	.660	5.361
14 FRUITS & VEGETABLES PREPARATIONS	1.011	1.682	.614	5.003
15 FEEDS	1.005	1.677	.610	4.989
16 FLOUR MILL PRODUCTS	1.004	1.677	.608	5.009
17 BREAKFAST CEREAL & BAKERY PROD.	1.004	1.677	.608	5.009
18 SUGAR & MOLASSES	1.004	1.677	.608	5.009
19 MISC. FOOD PRODUCTS	1.008	1.680	.613	4.993
20 BEVERAGES	.900	1.582	.485	4.246
21 TIRES & TUBES	1.094	1.695	.582	4.702
22 OTHER RUBBER PRODUCTS	1.092	1.693	.577	4.708
23 PLASTIC FABRICATED PRODUCTS	.987	1.647	.566	4.547
24 LEATHER & LEATHER PRODUCTS	1.092	1.728	.677	5.618
25 TEXTILE PRODUCTS	.923	1.606	.540	4.542
26 KNITTED PRODUCTS & CLOTHING	.970	1.659	.617	4.163
27 LUMBER & TIMBER	1.107	1.738	.637	4.807
28 VENEER & PLYWOOD	1.135	1.758	.648	4.930
29 OTHER WOOD PRODUCTS	1.139	1.759	.649	4.928
30 FURNITURE & FIXTURES	.962	1.636	.564	4.275
31 PULP	.941	1.618	.505	4.527
32 PAPER & PAPER PRODUCTS	.962	1.633	.523	4.554
33 PRINTING & PUBLISHING	1.279	1.868	.713	5.148
34 IRON & STEEL PRODUCTS	.758	1.351	.390	3.752
35 NON FERROUS METAL PROD.	.723	1.313	.370	3.657
36 BOILERS, TANKS & PLATES	1.048	1.668	.552	4.560
37 FABRICATED STRUCTURAL METAL PROD.	1.031	1.649	.544	4.508
38 OTHER METAL FABRICATED PROD.	1.046	1.665	.553	4.559

TABLE 11. TOTAL MULTIPLIERS (ABSOLUTE FORM, WITHOUT LEAKAGES)
BY DETAILED COMMODITY, 1979 -CONTINUED

COMMODITY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
39 AGRICULTURAL MACHINERY	1.071	1.692	.579	4.622
40 OTHER INDUSTRIAL MACHINERY	.992	1.628	.521	4.383
41 MOTOR VEHICLES	1.195	1.779	.666	5.167
42 MOTOR VEHICLE PARTS	1.107	1.713	.611	4.740
43 OTHER TRANSPORTATION EQUIPMENT	1.047	1.669	.576	4.556
44 APPLIANCES & RECEIVERS,HOUSEHOLD	1.131	1.739	.688	4.606
45 OTHER ELEC. PRODUCTS	1.130	1.760	.613	4.579
46 CEMENT & CONCRETE PRODUCTS	.887	1.569	.463	4.220
47 OTHER NON-METALLIC MINERAL PROD.	.890	1.571	.466	4.226
48 GASOLINE	.550	1.288	.253	3.874
49 FUEL OIL	.550	1.288	.253	3.874
50 LUBRICATING OIL & GREASE	.551	1.290	.254	3.873
51 OTHER PETROLEUM & COAL PROD.	.472	1.250	.216	2.963
52 FERTILIZERS	.678	1.425	.342	3.767
53 PHARMACEUTICALS	1.189	1.786	.814	4.421
54 INORGANIC CHEMICALS	.688	1.401	.348	3.743
55 ORGANIC CHEMICALS	.679	1.425	.343	3.769
56 INDUSTRIAL CHEMICAL PROD.	.685	1.421	.347	3.770
57 OTHER CHEMICAL PROD.	.767	1.491	.415	4.060
58 SCIENCE & LABORATORY EQUIP.	1.043	1.691	.616	4.694
59 MISC MANUFACTURED PRODUCTS	1.014	1.662	.594	4.548
60 CONSTRUCTION	1.118	1.702	.595	4.805
61 WHOLESALE & RETAIL TRADE	1.173	1.776	.801	4.412
62 TRANSPORTATION & STORAGE	.961	1.606	.523	4.203
63 RADIO & TELEVISION BROADCASTING	.965	1.688	.519	3.622
64 TELEPHONE & TELEGRAPH	.965	1.688	.519	3.622
65 POSTAL SERVICES	.965	1.688	.519	3.622
66 ELECTRIC POWER	.881	1.815	.364	3.451
67 OTHER UTILITIES	.847	1.759	.357	3.501
68 REAL ESTATE RENT	.601	1.314	.258	2.767
69 FINANCE, INSURANCE & REAL ESTATE	.584	1.301	.245	2.718
70 HEALTH & HOSPITAL SERVICES	1.202	1.821	.548	4.257
71 BUSINESS SERVICES	1.474	2.018	.935	4.757
72 ACCOMMODATION & MEALS	1.131	1.749	.909	4.645
73 OTHER PERSONAL & MISC. SERVICES	.939	1.604	.664	3.996
74 DUMMY COMMODITY I (1)	.973	1.539	.579	5.100
75 DUMMY COMMODITY II (2)	.993	1.560	.621	5.048
76 TRANSPORTATION MARGINS (3)	.961	1.606	.523	5.203
77 HOUSEHOLD SERVICES (4)	.716	1.210	.428	4.015

SEE FOOTNOTE(S) AT END OF TOTAL MULTIPLIERS TABLES

TABLE 12. TOTAL MULTIPLIERS (ABSOLUTE FORM, WITH LEAKAGES)
BY DETAILED COMMODITY, 1979

COMMODITY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
1 LIVE ANIMALS	.573	.979	.413	2.348
2 GRAINS	.523	.892	.377	2.141
3 OTHER AGRICULTURAL PRODUCTS	.461	.786	.332	1.892
4 FISHING AND TRAPPING PRODUCTS	.075	.163	.021	.307
5 FORESTRY PRODUCTS	.601	.745	.364	2.243
6 COAL	.473	1.011	.224	2.274
7 CRUDE MINERAL OILS	.278	.945	.110	1.974
8 NATURAL GAS	.277	.943	.110	1.969
9 NON-METALLIC MINERALS	.080	.242	.036	.516
10 SERVICES INCIDENTAL TO MINING	.616	1.028	.300	2.633
11 MEAT PRODUCTS	.533	.845	.354	2.892
12 DAIRY PRODUCTS	.433	.668	.258	2.105
13 FISH PRODUCTS	.007	.010	.004	.037
14 FRUITS & VEGETABLES PREPARATIONS	.067	.111	.042	.360
15 FEEDS	.411	.679	.255	2.205
16 FLOUR MILL PRODUCTS	.354	.586	.219	1.918
17 BREAKFAST CEREAL & BAKERY PROD.	.245	.405	.151	1.329
18 SUGAR & MOLASSES	.373	.618	.231	2.024
19 MISC. FOOD PRODUCTS	.073	.120	.045	.390
20 BEVERAGES	.255	.468	.131	1.243
21 TIRES & TUBES	.011	.016	.006	.044
22 OTHER RUBBER PRODUCTS	.024	.033	.012	.093
23 PLASTIC FABRICATED PRODUCTS	.192	.306	.113	.865
24 LEATHER & LEATHER PRODUCTS	.025	.038	.016	.138
25 TEXTILE PRODUCTS	.026	.044	.015	.130
26 KNITTED PRODUCTS & CLOTHING	.041	.071	.028	.164
27 LUMBER & TIMBER	.289	.445	.169	1.242
28 VENEER & PLYWOOD	.075	.112	.043	.322
29 OTHER WOOD PRODUCTS	.286	.427	.164	1.224
30 FURNITURE & FIXTURES	.153	.267	.093	.672
31 PULP	.083	.147	.043	.422
32 PAPER & PAPER PRODUCTS	.116	.199	.061	.569
33 PRINTING & PUBLISHING	.349	.459	.194	1.276
34 IRON & STEEL PRODUCTS	.081	.149	.040	.423
35 NON FERROUS METAL PROD.	.071	.134	.035	.383
36 BOILERS, TANKS & PLATES	.219	.331	.112	.907
37 FABRICATED STRUCTURAL METAL PROD.	.263	.400	.135	1.098
38 OTHER METAL FABRICATED PROD.	.113	.171	.058	.470

TABLE 12. TOTAL MULTIPLIERS (ABSOLUTE FORM, WITH LEAKAGES)
BY DETAILED COMMODITY, 1979 -CONTINUED

COMMODITY	HOUSEHOLD INCOME	G.D.P. AT FACTOR COST	EMPLOY-MENT	GROSS OUTPUT
39 AGRICULTURAL MACHINERY	.024	.036	.013	.100
40 OTHER INDUSTRIAL MACHINERY	.080	.129	.041	.346
41 MOTOR VEHICLES	.032	.043	.018	.135
42 MOTOR VEHICLE PARTS	.035	.050	.019	.142
43 OTHER TRANSPORTATION EQUIPMENT	.061	.095	.033	.261
44 APPLIANCES & RECEIVERS,HOUSEHOLD	.014	.020	.009	.053
45 OTHER ELEC. PRODUCTS	.047	.070	.025	.177
46 CEMENT & CONCRETE PRODUCTS	.450	.808	.226	2.198
47 OTHER NON-METALLIC MINERAL PROD.	.178	.319	.090	.867
48 GASOLINE	.304	.834	.123	2.664
49 FUEL OIL	.308	.847	.125	2.705
50 LUBRICATING OIL & GREASE	.300	.823	.122	2.625
51 OTHER PETROLEUM & COAL PROD.	.271	.868	.109	2.007
52 FERTILIZERS	.003	.006	.001	.016
53 PHARMACEUTICALS	.000	.000	.000	.000
54 INORGANIC CHEMICALS	.172	.387	.082	1.049
55 ORGANIC CHEMICALS	.142	.334	.067	.895
56 INDUSTRIAL CHEMICAL PROD.	.142	.327	.067	.878
57 OTHER CHEMICAL PROD.	.068	.142	.036	.397
58 SCIENCE & LABORATORY EQUIP.	.087	.131	.054	.373
59 MISC MANUFACTURED PRODUCTS	.030	.046	.018	.129
60 CONSTRUCTION	.636	.911	.325	2.680
61 WHOLESALE & RETAIL TRADE	.821	1.194	.599	2.863
62 TRANSPORTATION & STORAGE	.377	.636	.202	1.642
63 RADIO & TELEVISION BROADCASTING	.503	.903	.264	1.768
64 TELEPHONE & TELEGRAPH	.687	1.233	.361	2.415
65 POSTAL SERVICES	.691	1.240	.363	2.429
66 ELECTRIC POWER	.648	1.429	.232	2.421
67 OTHER UTILITIES	.318	.708	.116	1.277
68 REAL ESTATE RENT	.412	.988	.153	1.929
69 FINANCE, INSURANCE & REAL ESTATE	.352	.865	.128	1.676
70 HEALTH & HOSPITAL SERVICES	.735	1.077	.302	2.362
71 BUSINESS SERVICES	.599	.767	.392	1.702
72 ACCOMMODATION & MEALS	.736	1.094	.678	2.859
73 OTHER PERSONAL & MISC. SERVICES	.541	.939	.420	2.259
74 DUMMY COMMODITY I (1)	.324	.481	.221	2.229
75 DUMMY COMMODITY II (2)	.442	.686	.307	2.735
76 TRANSPORTATION MARGINS (3)	.377	.636	.202	2.642
77 HOUSEHOLD SERVICES (4)	.345	.597	.215	2.364

SEE FOOTNOTE(S) AT END OF TOTAL MULTIPLIERS TABLES

FOOTNOTES

(1) The dummy industry and commodity technique is used in input-output tables to deal with "catch-all" categories of inputs reported by establishments. For example, dummy industry I contains office supplies. Instead of finding the commodity content (paper, pencils, paper clips, etc.) of office supplies for each industry, it is estimated for one industry called "office supplies" whose output is equal to the total purchases of office supplies by all industries. Also included in dummy industry I are four other similar inputs - operating supplies, cafeteria requirements, laboratory supplies and machinery repair services.

Corresponding to each dummy industry, there is one dummy commodity. Thus, office supplies, operating supplies, cafeteria requirements, laboratory supplies and machinery repair services are included in dummy commodity I in all commodity tables.

(2) Dummy industry II includes two additional dummy industries - travel and entertainment, and advertising and promotion. Corresponding dummy commodities are included in dummy commodity II in commodity tables.

(3) The transportation margins dummy industry and commodity technique is used in input-output tables to deal with the transportation cost associated with the movement of commodities from point of production to purchasers. All such transportation costs are called transportation margins which are paid by purchasers. It is difficult to

identify these transportation costs by type of transport (e.g., air transport, rail transport, truck transport, etc.) for each commodity and for each industry. Therefore, all these transportation margins are routed through a dummy industry called "transportation margins". This dummy industry purchases all types of transport from the transportation industry and produces the dummy commodity - "transportation margin" which is allocated by commodity for each industry and final demand category.

(4) "Households" is an industry when the model is closed with respect to households to examine the feedback effects of spending the additional income generated in the production process. "Households" consist of persons, unincorporated businesses and non-profit organizations. The inputs of this industry are the commodities in the personal expenditure column. The output of this industry is "household services" which appears in commodity tables. "Household services" consist of labour and capital services provided by households.

APPENDICES

APPENDIX I

DATA SOURCES

Most of the detailed data required for the calculation of multipliers are contained in 1979 Alberta Input-Output Tables. Additional data requirements and sources used are listed below.

1. Employment by industry: To calculate employment multipliers data on employment - paid and other than paid workers - by industry are obtained from the Input-Output Division, Statistics Canada.

2. Personal Income: Data about Personal Income and Outlay components are required to close the model and to calculate household income multipliers. These data are obtained from Alberta Economic Accounts, 1984, (Table 7), published by the Bureau. Household income is treated as the sum of wages, salaries and supplementary labour income, military pay and allowances, net income of unincorporated business, interest, dividends and miscellaneous investment income and current transfers to persons. The distribution of the first three components by industry is available in the 1979 input-output tables. Transfers to persons fall outside the production system, thus is not included in GDP. Industrial distribution of interest, dividends, and miscellaneous investment income is obtained in two steps: (a) wherever possible, the different components of this item are allocated to industries using the worksheet details available in the personal sector of Alberta Economic Accounts; and (b) the remainder of the total after the first step is allocated to industries using operating surplus as an allocator.

APPENDIX II

METHODOLOGY

The input-output model, when used to study the effects on the economy of a change in the final demand, becomes an impact, or multiplier model. Details about deriving impact tables from input-output tables and the mathematical description of the open input-output model were provided in an earlier Bureau publication on 1974 Alberta input-output tables. This appendix presents, in non-technical terms, the methodology employed to calculate the four types of multipliers included in this report.

In simple terms, the methodology employed to derive multipliers consists of two steps: (a) deriving a total requirements table for a dollar increase in final demand, or a dollar increase in production and (b) applying direct factor coefficients to the total requirements table to obtain multipliers. The total requirements table is the basis for calculation of all multipliers. This table presents the direct and indirect effects on industry outputs of a dollar increase in final demand or a dollar increase in production. For example, a dollar increase in agricultural production creates demand for all industry outputs the agriculture industry is purchasing to produce the additional dollar of output. This, in turn, necessitates an increase in the production of all those industries supplying inputs to the agriculture industry. They, in turn, increase the demand for outputs of their suppliers. This process continues until the economy reaches an equilibrium position, i.e., where supply equals demand. In this equilibrium position, the level of the agriculture industry's output is determined by the direct

and indirect effects of a dollar increase in the final sales of the agriculture industry's output. All these effects can be expressed using the technology matrix B, which provides the direct requirements to produce one dollar of output of each industry. The matrix (I-B) is called the Leontief matrix, where I is an identity matrix with appropriate dimensions. The inverse of (I-B) provides the total requirements table in a simple case of an industry by industry input-output table. Each column in the inverse of (I-B) provides the direct and indirect requirements of industry outputs from one dollar increase in the final sales of the output of the industry corresponding to that column. The column sum gives the "output multiplier" for the industry corresponding to that column. From this output base, we can move to any other category by multiplying the direct coefficients for that category with the direct and indirect effects on industry outputs. For example, employment multipliers are calculated by multiplying the employee/output coefficients of industries with the entries in each column of the total requirements table. This basic procedure is repeated to calculate other types of multipliers. Specifically, all multiplier results presented in this report are expressed in terms of the following:

(a) Household Income: This is the sum of wages, salaries and supplementary labour income; military pay and allowances; net income of unincorporated business; interest, dividends and miscellaneous investment income.

(b) GDP at factor cost: This is the sum of wages, salaries and supplementary labour income; military pay and allowances; net income of unincorporated business; inventory valuation adjustment and operating surplus, which includes profits, investment income, and capital consumption allowances.

(c) Employment: This is the number of paid and non-paid workers (self employed etc.).

(d) Gross Output: This equals shipments adjusted for inventory change.

For items (a), (b) and (d) above, the direct coefficients are calculated by dividing each category with the industry's total output. Employment is expressed as the number of workers per $10,000 (constant 1979 dollars) of total output. This point should be remembered when interpreting the employment multipliers given in the tables.

The multiplier tables presented in this report have been derived using the closed input-output model, with and without leakages from domestic production. As stated earlier in the report, multipliers based on the open model are available on request. The distinctions between open and closed models and the method of closing the model with respect to households are explained next.

Open Input-Output Model

In this model, all the categories of final demand are treated outside the production system. Any autonomous increase in final demand is directed to the production system and the resulting equilibrium levels of outputs are calculated. In this model, the analysis of the level of income is incomplete, that is, the analysis stops at the point where demand and supply are satisfied. But, in fact, the productive activity by industries generates income which, in turn, stimulates additional final expenditure. This is not captured in the open model. Given a change in final demand, the open model is capable of evaluating only the direct and indirect effects on output requirements.

Only part of the overall impact of a given change in final demand can be evaluated from an open model. Therefore, the multipliers derived using an open input-output model are treated as lower limits of actual multipliers and are designated as "Simple Multipliers".

Closed Input-Output Model

In this model, one or more of the categories of final demand are included in the production system. The closed model takes into account both the impact of demand on supply and of supply on demand. This means that the equilibrium output levels calculated from a closed model incorporate not only the outputs required to meet a given final demand, but also the outputs required to meet the change in final demand which is induced by changes in production and income. In other words, the closed model is capable of evaluating the direct, indirect and induced effects on output requirements of a change in final demand. The multipliers based on the closed model are closer to actual multipliers and are identified by the term "Total Multipliers".

As stated above, an input-output model may be closed with respect to one or more of the final demand categories. In this report, the model is closed with respect to households only. This is accomplished by adding another industry (households) column and another commodity (household services) row to the "Use" matrix. The inputs of the household industry consist of goods and services in the personal expenditure column in the final demand matrix. The level of household industry activity is given by total personal income. Households produce labour and capital services which are purchased by other industries and governments. The household services row consists of household incomes received from each industry. Similarly, the

"Production" matrix is augmented by adding a "household services" commodity column and a "households" industry row. No other industry in the "Production" matrix produces household services and "households" industry produces no other commodity except household services. These augmented "Use" and "Production" matrices are employed in deriving the multipliers based on closed models.

APPENDIX III

1979 AND 1974 COMPARISON

The following tables provide comparisons of the 1974 and 1979 multipliers. Overall, the 1979 values are slightly lower than the 1974 values. This suggests somewhat greater degree of leakages and likely reflects the tightness of the rapidly growing economy in 1979 vis-a-vis the somewhat slower growing 1974 economy.

Comparisons are made for household income, GDP at factor cost and gross output multipliers. Employment multipliers are not strictly comparable unless the output is deflated to 1974 dollars. In the case of industry multipliers, the 1979 multiplier values are slightly less than 1974 values. It is only in the case of household income multipliers, the change is slightly higher than the other two types. In the case of commodity multipliers (with leakages from both intermediate and final demand stages), the 1979 multiplier values are slightly lower than 1974 values in most cases except for those commodities for which we depend on imports. For example, autos, trucks and electrical products are some of such commodities.

TOTAL MULTIPLIERS (ABSOLUTE FORM, WITH LEAKAGES) BY DETAILED INDUSTRY: A COMPARISON OF 1979 AND 1974

INDUSTRY	HOUSEHOLD INCOME			G.D.P. AT FACTOR COST			GROSS OUTPUT		
	1979	1974	DIFF.	1979	1974	DIFF.	1979	1974	DIFF
1 AGRICULTURE	.648	.896	-.248	1.107	1.246	-.139	2.656	3.041	-.385
2 FORESTRY	.890	.726	.164	1.070	1.052	.018	3.284	3.223	.061
3 FISHING, HUNTING AND TRAPPING	.487	.845	-.358	1.051	1.299	-.248	1.983	2.613	-.630
4 COAL MINES	.477	.396	.081	1.018	.989	.029	2.290	2.139	.151
5 PETROLEUM AND GAS WELLS	.278	.324	-.046	.948	1.010	-.062	1.978	2.099	-.121
6 OTHER MINES AND QUARRIES	.454	.578	-.124	1.037	1.075	-.038	2.264	2.541	-.277
7 SERVICES INCIDENTAL TO MINING	.618	.842	-.224	1.028	1.233	-.205	2.639	2.813	-.174
8 MEAT AND POULTRY PRODUCTS INDUSTRY	.617	.774	-.157	.980	1.093	-.113	3.424	3.579	-.155
9 DAIRY FACTORIES	.601	.708	-.107	.927	.987	-.060	2.923	3.138	-.215
10 MISC. FOOD INDUSTRIES	.504	.627	-.123	.834	.900	-.066	2.734	3.096	-.362
11 BEVERAGE INDUSTRIES	.480	.544	-.064	.884	.869	.015	2.345	2.551	-.206
12 RUBBER INDUSTRIES	.610	.584	.026	.846	.842	.004	2.417	2.427	-.010
13 LEATHER INDUSTRIES	.606	.699	-.093	.916	.986	-.070	3.348	3.063	.285
14 TEXTILE INDUSTRIES	.371	.483	-.112	.648	.741	-.093	1.918	2.212	-.294
15 CLOTHING INDUSTRIES	.522	.546	-.024	.910	.774	.136	2.077	2.158	-.081
16 WOOD INDUSTRIES	.613	.631	-.018	.918	.881	.037	2.636	2.843	-.207
17 FURNITURE AND FIXTURES INDUSTRIES	.491	.605	-.114	.881	.852	.029	2.160	2.382	-.222
18 PAPER AND ALLIED INDUSTRIES	.474	.489	-.015	.837	.944	-.107	2.405	2.376	.029
19 PRINTING AND PUBLISHING	.733	.678	.055	.964	1.023	-.059	2.680	2.519	.161
20 PRIMARY METAL INDUSTRIES	.361	.410	-.049	.685	.687	-.002	1.952	2.089	-.137
21 METAL FABRICATING INDUSTRIES	.553	.506	.047	.835	.825	.010	2.289	2.180	.109
22 MACHINERY INDUSTRIES	.540	.563	-.023	.831	.794	.037	2.268	2.342	-.074
23 TRANSPORTATION EQUIPMENT INDUSTRIES	.548	.491	.057	.717	.689	.028	2.304	2.239	.065
24 ELECTRICAL PRODUCTS INDUSTRIES	.589	.519	.070	.724	.631	.093	2.322	2.349	-.027
25 NON-METALLIC MINERAL PRODUCTS INDUSTRIES	.523	.585	-.062	.939	1.007	-.068	2.554	2.634	-.080
26 PETROLEUM AND COAL PRODUCTS INDUSTRIES	.330	.414	-.084	.905	1.121	-.216	2.890	3.121	-.231
27 CHEMICAL AND CHEMICAL PRODUCTS INDUSTRIES	.352	.454	-.102	.829	.857	-.028	2.220	2.455	-.235
28 MISC. MANUFACTURING INDUSTRIES	.527	.587	-.060	.794	.847	-.053	2.274	2.455	-.181
29 CONSTRUCTION INDUSTRY	.636	.681	-.045	.911	.946	-.035	2.680	2.689	-.009
30 WHOLESALE AND RETAIL TRADE INDUSTRY	.851	.902	-.051	1.228	1.259	-.031	2.930	3.005	-.075
31 TRANSPORTATION AND STORAGE INDUSTRY	.608	.683	-.075	1.023	1.107	-.084	2.645	2.835	-.190
32 COMMUNICATIONS INDUSTRY	.693	.718	-.025	1.244	1.203	.041	2.437	2.550	-.113
33 UTILITIES	.650	.682	-.032	1.433	1.205	.228	2.430	2.457	-.027
34 FINANCE, INSURANCE AND REAL ESTATE	.421	.488	-.067	1.027	1.076	-.049	1.985	2.147	-.162
35 HEALTH AND HOSPITAL INDUSTRY	.876	1.121	-.245	1.284	1.375	-.091	2.817	3.175	-.358
36 BUSINESS SERVICES INDUSTRY	1.132	.908	.224	1.432	1.292	.140	3.181	2.949	.232
37 ACCOMMODATION AND FOOD SERVICES INDUSTRY	.741	.823	-.082	1.101	1.142	-.041	2.888	3.023	-.135
38 OTHER PERSONAL AND MISC. SERVICES INDUSTRY	.630	.745	-.115	1.090	1.173	-.083	2.654	2.756	-.102
39 DUMMY INDUSTRY I (1)	.324	.381	-.057	.481	.549	-.068	2.229	2.398	-.169
40 DUMMY INDUSTRY II (2)	.442	.551	-.109	.686	.840	-.154	2.735	3.086	-.351
41 TRANSPORTATION MARGINS (3)	.377	.616	-.239	.636	1.000	-.364	2.642	3.559	-.917
42 HOUSEHOLDS (4)	.345	.364	-.019	.597	572	.025	2.364	2.345	.019

SEE FOOTNOTE(S) AT END OF TOTAL MULTIPLIERS TABLES

TOTAL MULTIPLIERS (ABSOLUTE FORM, WITH LEAKAGES) BY MAJOR COMMODITY: A COMPARISON OF 1979 AND 1974

COMMODITY	HOUSEHOLD INCOME			G.D.P. AT FACTOR COST			GROSS OUTPUT		
	1979	1974	DIFF.	1979	1974	DIFF.	1979	1974	DIFF
1 LIVE ANIMALS	.569	.787	-.218	.964	1.089	-.125	2.270	2.617	-.347
2 GRAINS	.519	.670	-.151	.878	.927	-.049	2.069	2.226	-.157
3 OTHER AGRICULTURAL PRODUCTS	.457	.673	-.216	.774	.932	-.158	1.829	2.246	-.417
4 FISHING AND TRAPPING PRODUCTS	.076	.415	-.339	.164	.635	-.471	.308	1.272	-.964
5 FORESTRY PRODUCTS	.596	.641	-.045	.745	.922	-.177	2.230	2.780	-.550
6 MINERAL FUELS	.312	.357	-.045	.955	1.020	-.065	2.037	2.141	-.104
7 NON-METALLIC MINERALS	.071	.127	-.056	.185	.314	-.129	.432	.715	-.283
8 PRODUCTS RELATING TO MINES	.313	.358	-.045	.959	1.021	-.062	2.044	2.144	-.100
9 MEAT, FISH AND DAIRY PRODUCTS	.400	.492	-.092	.704	.776	-.072	2.113	2.298	-.185
10 FRUIT, VEG., FEED & MISC. FOOD PROD.	.197	.264	-.067	.349	.421	-.072	1.056	1.269	-.213
11 BEVERAGES	.260	.317	-.057	.462	.507	-.045	1.406	1.528	-.122
12 RUBBER, LEATHER, PLASTIC FAB. PROD.	.087	.097	-.010	.154	.154	.000	.469	.465	.004
13 TEXTILE PRODUCTS	.034	.032	.002	.059	.050	.009	.179	.148	.031
14 KNITTED PRODUCTS AND CLOTHING	.039	.039	.000	.068	.062	.006	.207	.187	.020
15 LUMBER, SAWMILL, OTHER WOOD PROD.	.205	.262	-.057	.363	.418	-.055	1.099	1.262	-.163
16 FURNITURE AND FIXTURES	.150	.196	-.046	.266	.312	-.046	.809	.939	-.130
17 PAPER AND PAPER PRODUCTS	.116	.118	-.002	.206	.188	.018	.624	.568	.056
18 PRINTING AND PUBLISHING	.234	.304	-.070	.416	.486	-.070	1.265	1.465	-.200
19 PRIMARY METAL PRODUCTS	.103	.104	-.001	.183	.166	.017	.556	.500	.056
20 METAL FABRICATING PRODUCTS	.145	.179	-.034	.256	.286	-.030	.778	.862	-.084
21 MACHINERY AND EQUIPMENT	.059	.065	-.006	.107	.106	.001	.316	.314	.002
22 AUTOS, TRUCKS, OTHER TRANS. EQUIP.	.034	.085	-.051	.059	.135	-.076	.174	.404	-.230
23 ELECTRICAL AND COMMUNICATIONS PROD.	.035	.070	-.035	.063	.114	-.051	.158	.297	-.139
24 NON-METALLIC MINERAL PRODUCTS	.304	.347	-.043	.540	.555	-.015	1.641	1.673	-.032
25 PETROLEUM AND COAL PRODUCTS	.408	.482	-.074	.850	.932	-.082	2.311	2.474	-.163
26 CHEMICALS AND CHEMICAL PRODUCTS	.131	.168	-.037	.232	.269	-.037	.705	.811	-.106
27 MISC. MANUFACTURED PRODUCTS	.044	.112	-.068	.077	.173	-.096	.231	.494	-.263
28 CONSTRUCTION	.594	.652	-.058	.906	.928	-.022	2.625	2.654	-.029
29 WHOLESALE AND RETAIL TRADE	.825	.893	-.068	1.199	1.249	-.050	2.856	2.993	-.137
30 TRANSPORTATION AND STORAGE	.383	.624	-.241	.636	.996	-.360	1.616	2.542	-.926
31 COMMUNICATION SERVICES	.663	.722	-.059	1.190	1.206	-.016	2.320	2.557	-.237
32 OTHER UTILITIES	.516	.602	-.086	1.145	1.064	.081	1.953	2.175	-.222
33 REAL ESTATE RENT	.410	.483	-.073	.989	1.053	-.064	1.922	2.115	-.193
34 FINANCE, INSURANCE AND REAL ESTATE	.351	.433	-.082	.867	.957	-.090	1.672	1.911	-.239
35 BUSINESS, PERSONAL & OTHER MISC. SVCS	.642	.796	-.154	.977	1.146	-.169	2.328	2.751	-.423
36 DUMMY COMMODITY I (1)	.316	.383	-.067	.483	.557	-.074	2.250	2.445	-.195
37 DUMMY COMMODITY II (2)	.429	.541	-.112	.702	.826	-.124	2.714	3.062	-.348
38 TRANSPORTATION MARGINS (3)	.383	.624	-.241	.636	.996	-.360	2.616	3.542	-.926
39 HOUSEHOLD SERVICES (4)	.344	.367	-.023	.599	.581	.018	2.343	2.349	-.006

SEE FOOTNOTE(S) AT END OF TOTAL MULTIPLIERS TABLES